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ABSTRACT

This study focused on the use of computer-assisted instruction with high risk students. Subjects were eleventh grade American history students who were presented the same material either by their regular instructor or by a computer sequence developed with an authoring system. Despite a statistically significant advantage for the conventionally-taught students at the time of the pretest, the group receiving computer-assisted instruction (CAI) had a statistically reliable advantage at the time the lessons concluded. It is suggested that this difference can be attributed to three factors: time factors involved in learning the lessons; the fact that students in the conventionally taught group could not make up work missed, but CAI group students could; and a Hawthorne effect whereby the improvement was due to a change in classroom regimen. Thus, it is suggested that CAI offers a potential for remedial instruction for the high risk student, but such CAI should be instructor-designed in order to maximize individualization of instruction. (EW)

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CAI and the High-Risk Student

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The profound changes that were to be wrought by introducing computers into the classroom have not materialized. Although the research is mainly supportive of the impact which using computers for instruction has on student achievement,1 the "promise" of educational computing remains at least partially unfulfilled. Any discussion of educational computing makes it clear that there are a number of problems which have intervened. Inservice was probably foremost. Using computers as teaching tools required a substantial retraining effort. But even if the training could be provided, and in many cases it has been, the quality and appropriateness of prepared software have been disappointing. The glitter of early materials often obscured a lack of instructional substance.

Commercially-Prepared v. Authored Instruction

There is an inherent risk taken in using commercially-prepared materials of any kind in the classroom. By default, the instructional goals and objectives become those of the software developer who has little understanding of particular classroom conditions, or the inclinations of specific instructors.

Authoring systems offer an important response to this problem. They are much easier to use than conventional programming languages. The simplicity of authoring systems

allows instructors who have access to a computer and authoring software quickly to develop their own instructional sequences. These lessons can reflect the individual's teaching style and the characteristics of a particular group of students.

Importantly, the primary beneficiary of authoring instruction may be the student who is at particular risk because of the tendency to be absent or because of low achievement. Such "high-risk" students are often involved in an unfortunate downward spiral in which low achievement and, or truancy increase the opportunity for failure, prompting lower motivation to attend class and expend effort, etc.2

If these problems can be partially remediated with a computerized instructional sequence (CAI), the effects of having missed class or not done well on a previous days work can be minimized. In a conventional setting, that is usually not possible. The teacher simply cannot re-deliver a prior day of instruction before continuing with the current lesson. With CAI it is a relatively simple matter to load the prior instruction for the student who is struggling before he/she continues.

Empirical evidence of these assumptions stems from research recently conducted with eleventh grade American History students. Subjects were taught either by their regular instructor or by a computer sequence developed with an authoring system. In either case, the materials were from the same script and were presented over the same number of class periods. Despite a statistically

significant advantage on behalf of the conventionally-taught group at the time of pretest, the CAI group had a statistically reliable advantage at the time the lessons concluded.4

Analyzing the Effect of CAI

There are a number of possible explanations. Perhaps the degree of control which the student has over the time variable in CAI helps explain the difference between treatment and control groups in this study. The individual user, rather than something as ephemeral as the time required by "the typical student," can be the basis for the decision about when to proceed.

Another facet of the time variable is time missed. It became clear during the experiment that with the CAI it was relatively simple for a student to make up a missed class. One simply loaded the instruction from the prior period before the student proceeded to the current day's work. A CAI approach minimizes the "cumulative effect" of missing class and learners appear to pay less of a performance penalty when CAI is available.

A third explanation involves the workings of the "Hawthorne Effect" which suggests that an improvement in performance can be expected following distinctive changes in classroom regimen, but that the improvement will be short-lived. When the innovation is of comparatively short duration, as it was in this experiment, it becomes difficult to "factor out" the impact of novelty from the

impact of an alternative instructional approach.

There is no compelling reason why that need be considered a weakness, however. Perhaps further research will suggest that CAI can be used best when it is employed periodically to supplement traditional instruction. Competent instructors use a variety of techniques with precisely the intent that students will be invigorated by an instructional change-of-pace. The superiority may be transient, but the data gathered in this study suggest sufficient promise to justify further experimentation and study.

Conclusions

None of the explanations offered above works to the disadvantage of the struggling student. CAI generally offers a great potential for remedial instruction which Good and Brophy have noted to be a weak link in the educational process.5 Whether that particular application will be actively pursued remains to be seen, but the need is clear. A popular newsweekly recently reported that 30-46% of the students entering the ninth grade in American cities will drop out before graduating.3 As a consequence of concern over low achievment and student drop-outs, and as a result of the pervasiveness of the technology in contemporary society, it is important to consider the role that instructor-designed computer presentations may play in the success of high-risk students.

Yesterday's instructional panaceas have encouraged most who teach to develop a healthy skepticism regarding instructional "philosophers' stones." Commercially-prepared CAI has a developing research literature. The tradition for teacher-developed CAI, however, is much weaker but suggests sufficient promise to recommend further examination.

Notes

1. R.L. Bangert, J.A. Kulik, and C.C. Kulik, "Individualized Systems of Instruction in Secondary Schools," Review of Educational Research, 53, (1983): 143-158.
D.B. Thomas, "The Effectiveness of Computer-based Instruction: Secondary Schools. Association for Educational Data Systems Journal, 12, (1979): 103-116.
P.K. Burns and W.C. Bozeman, "Computer Assisted Instruction and Mathematics Achievement: Is There a Relationship?" Educational Technology, 21 (1981): 32-39.

2. See M.C. Wang and C.M. Lindvall, "Individual differences and school learning environments." Review of Research in Education, 11, 161-225.

3. Time, Feburary 1, 1988, p. 55.

4. D.E. Tanner, Authoring alternatives in CAI. Collegiate Microcomputer, 1987.

5. T.L. Good and J.E. Brophy, Looking In Classrooms, 4th ed., New York: Harper and Row, 1987.